

Online Professional Development for Project Based Learning: Pathways to Systematic Improvement

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Abstract

This paper describes efforts to increase the prevalence, rigor and relevance of Project Based Learning in US schools and internationally. Under a grant from the Fund for the Improvement of Post Secondary Education (FIPSE), US Department of Education, the Buck Institute for Education and partners are offering: 1) an online staff development resource, 2) modules for use in teacher training institutions, 3) a re-usable online 3-credit course, and 4) a way to share projects, collaborate on research, and advance understanding of effective use of projects in the classroom. The PBL-Online web site will offer a multi-pathway, interactive, video rich website designed to prepare pre-service and practicing teachers to implement academically rigorous, standards-focused Project Based Learning (PBL). The online materials are based on the BIE *Project Based Learning Handbook* that provides teachers with in-depth, systematic instruction in the planning, implementation and assessment of standards-focused PBL. Our work with the Handbook was recently highlighted as a key resource for proponents of small school reform in an evaluation of the Bill & Melinda Gates Foundation National School District and Network Grants Program conducted by the American Institutes for Research with SRI International on page 65 of the report (<http://smallhs.sri.com>). Making this Handbook available online and offering online instruction in its use will support wider use and study of this promising but often either underutilized or misunderstood approach.

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What is PBL and Why Study It?

There are many definitions and approaches to Project Based Learning. We define standards-focused Project Based Learning as... *a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks* (Buck Institute for Education, 2003). Theoretical arguments linking the learning activities characterizing Project Based Learning with several decades of research in cognitive psychology are advanced in *How People Learn* (Bransford, Brown & Cocking, 1999), a work commissioned by the National Research Council.

There is an increasing amount of scientifically based research that supports the use of Project Based Learning (Thomas, 2000) under certain conditions. A number of research studies are posted on the website of the George Lucas Educational Foundation (www.gleef.org) which notes "A growing body of academic research supports the use of project-based learning in schools as a way to engage students, cut absenteeism, boost cooperative learning skills, and improve test scores. Those benefits are enhanced when technology is used in a meaningful way in the projects" (GLEF, 2004). Studies that are listed and that appear to support PBL include:

- a three-year 1997 study of two British secondary schools (Boaler, 2002).
- a 1992 study of 700 students from 11 school districts in Tennessee (CTGV, 1992).
- Longitudinal studies by the Center for Research in Educational Policy at the University of Memphis and University of Tennessee at Knoxville (Ross, Sanders, Stringfield, Wang & Wright, 1999, June; Ross, Sanders & Wright, 2000, July).
- analyses of data from the math portion of the 1996 National Assessment of Educational Progress test (Wenglinsky, 1998)

Project Based Learning is not only a potentially effective instructional approach, but it is also an essential component of several current school reform models. A series of studies showed substantial school-wide gains for schools adopting PBL methods in Iowa, Denver, Boston, and in Maine (Expeditionary Learning Outward Bound, 1999). Other research showed that PBL had substantial impact on student achievement in Union City New Jersey schools (Honey & Henríquez, 1996, April).

Research on the restructuring of Chicago Public Schools provides compelling evidence for the importance of engaging students in the deep thinking and problem solving that characterizes Project Based Learning. This study of the relationship of classroom instructional practices and student achievement on standardized tests concludes:

This study provides strong empirical support that "instruction matters." We found clear and consistent evidence that in Chicago's elementary schools the instructional approach teachers use influences how much students learn in reading and mathematics. Moreover, interactive teaching methods were associated with more learning in both subjects. Our findings call into serious question the assumption that low-achieving, economically disadvantaged students are best served by teaching that emphasizes didactic methods and review (Smith, Lee & Newmann, 2001, January).

Finally, the relationship between PBL and school restructuring was demonstrated in a five-year study by University of Wisconsin-Madison researchers who analyzed data from more than 1,500 elementary, middle, and high schools and conducted field studies in 44 schools in 16 states between 1990 and 1995. The researchers found that innovative school reforms, such as portfolio assessment and shared decision making, are more effective if combined with meaningful student projects and assignments demanding deep thinking and inquiry from students (Newmann & Wehlage, 1995).

Nagging Concerns about the Quality of PBL in Classrooms

Assigning students projects to do or telling teachers they should use projects in their classrooms does not automatically mean they will take advantage of the rich learning opportunities available. This is why it is necessary to emphasize well-implemented, standards-focused, academically rigorous Project Based Learning. Projects are used as a regular part of students' classroom experience, especially in English, elementary and vocational classes (Ravitz, Becker & Wong, 2000) but this does not assure they are used well. There is also concern about student capacity for adopting PBL learning methods.

What the above studies have in common is that they examined particularly well-structured and extensively developed projects that were not created by teachers alone. These may be the exception to the rule. Most projects are probably created by individual teachers or groups of teachers working informally without

support. Project Based Learning (PBL) is not a new idea, but even with a long history it has not been widely incorporated as a method of teaching core academic standards.

It is more common to find teachers assigning their students projects in addition to reading, tests or worksheets, or using a project to illustrate or apply concepts introduced in lectures and class discussions. Such projects are generally presented as “a dessert” to follow the main course of learning – which is approached in a traditional, teacher-centered fashion. These “application/illustration” projects or activity-based learning may pique student interest, but typically, they do not require deep thinking skills such as analyzing and evaluating information, evaluating one’s own activities and accomplishments, planning a course of extended actions, constructing a solution from a variety of sources, or sharing one’s result and receiving critique from others outside the classroom. This is demonstrated in the findings from a carefully designed, 1998 nationwide survey of K-12 teachers. This study found that a majority of teachers (between 60% and 99% of teachers of different subjects) reported doing projects lasting a week or more at least “sometimes” with their classes. However, these projects often lack the characteristics that research has shown lead to deep and meaningful thinking, such as independent problem solving, practice in self-assessment and self-reflection, socially useful activity, or public accountability for significant learning (Ravitz, Becker & Wong, 2000, p.35)

The “Small Schools Movement” relies heavily on PBL as the instructional methodology of choice, but a recent evaluation highlights the difficulty of designing PBL environments from scratch. “Many successful small public schools of choice, such as charter and magnet schools, pride themselves on personalizing instruction, through such techniques as emphasizing in-depth projects [but in the start-up schools studied] these instructional practices were more the exception than the rule. . . . Many teachers . . . lacked models and ready-to-use curricula for project-based learning (Hendrie, 2003, April 23).

We conclude that teachers require explicit guidance and support for implementing PBL. In the book *Learning by Heart*, Roland Barth (2001) discusses the risk that teachers take when departing from traditional classroom activities and beginning to implement projects. Without the support of colleagues and the guidance of useable curricula or a clear methodology, teachers are “too busy” or retreat into the security of the old ways.

To help accomplish effective implementation of PBL in K-12, teachers require a systematic, standards-focused planning process and implementation and evaluation templates. This reduces the risk and the fear of failure teachers often experience when departing from the traditional delivery of information to students. It does this by offering classroom-proven strategies for meeting academic standards and engaging students in cognitively demanding and socially productive projects. Components of our approach are specifically designed to overcome the “culture of caution” so that teachers will take the steps and have the confidence and guidance they need as they begin to implement standards-focused PBL for the first time or with greater emphasis and determination.

Offering a Well-Defined, Standards-Based Approach

The website and online course presented in this paper are built around a specified set of steps to plan, implement and assess effective projects in classrooms. These are based on a proven methodology developed and refined by BIE with teachers over a five-year period and expressed in the second edition of the *BIE Project Based Handbook*. It has been developed to structure the collective wisdom of many teachers who have successfully used PBL in their classrooms. Our approach represents a process – a methodology – for developing projects. We leave the content up to teachers. In fact, one of the exciting possibilities for this work is teachers learning our methodology and then going out on the web and incorporating resources into their project design, or even using their knowledge of PBL to adapt online projects to be more standards based and to meet the requirements of their classrooms and students.

The model that serves as the framework for the five interactive PBL Modules is available online at: <http://edtech.boisestate.edu/FIPSE/>. Building on the PBL Handbook, PBL-Online divides the project planning process into five steps, offered as 2-hour online modules or together as a 3-credit course. Each module focuses on a different element of project planning. These modules may be used as the central content of an online course in Project Based Learning or as supplementary material for a blended or face to face course in PBL. Each online PBL module is designed as a separate, two-hour module. These are appropriate for teachers who wish to improve their capacity to use PBL in the classroom or for School of Education professors wishing to include training in PBL as part of a methods or educational technology course.

1. *Begin With the End in Mind*: Planning for the end result
2. *Craft the Driving Question*: Select and refine a central question
3. *Plan the Assessment*: Define outcomes and assessment criteria
4. *Map the Project*: Decide how to structure the project
5. *Manage the Process*: Tools and strategies for successful projects

Two other sections of the Handbook offer tips on successful implementation from teachers, and give direction to the planning process using a Project Planning Form as a guide. These are incorporated into the online modules. The modules also draw on current Boise State University course material and content from the GLEF website. They include both new digital video and audio of classrooms and teachers, and previously unused video, graphics and audio content from the GLEF archives.

There are a huge number of high quality, content-based projects that can be used. However, there are few resources that enable teachers to become experts in developing and applying projects in the classroom. Although there are a number of websites that describe or have examples of classroom projects, they rarely describe the ingredients and characteristics necessary for powerful Project Based Learning in a systematic, standards-focused manner or offer tools for teachers to design such projects. As a result, teachers are often left to master PBL by themselves, with little or no mentoring and guidance, and no professional community to turn to for ideas and assistance. Without such professional support teachers may be unwilling to take on the risk of using PBL in their classroom (Barth, 2001) and students will fail to experience the opportunities for in-depth learning and problem solving that PBL offers.

On a leading site hosted by WestEd (www.pblnet.org), a federally-funded Regional Educational Laboratory and Regional Technology in Education Consortium (RTEC), the *BIE PBL Handbook* is presented as a prominent resource for designing projects. The site also lists exemplary projects and resource links to other PBL organizations, but no specific assistance is provided for the design and implementation of projects.

Similarly, the Challenge 2000 Multimedia Project (<http://pblmm.k12.ca.us>), another leading PBL online site, includes data, research, project ideas, and technology links for teachers. There is also a list of project components, and a description of common project activities. But again there is no step-by-step advice about how to assemble the pieces (Penuel, Korbak, Yarnall, & Pacpaco (2001). A third site, sponsored by Co-nect (www.co-nect.net), describes PBL, but does not offer online design assistance to teachers, as it is associated with a subscription based, school-level reform.

A review of the sites listed on the resources page of each of the above organizations yields the same results. Though information, including attention to planning and assessment, is available online, it is generally fragmented and presented in a flat and un-involving fashion. Advice is generally offered as a prescription with no opportunity for conversation. Complexities, missteps, and the considerations which lead a teacher to make specific choices and resolve particular issues in specified ways are not explored. There is little insight into the thought processes that go into designing an effective project. (The website of the George Lucas Educational Foundation [www.glef.org], a key partner in the development of this project, is an exception, and there may be others). The Collaboratory project at Northwestern University (<http://collaboratory.nunet.net/cwebdocs/index.html>) provides for interaction among teachers, but it is offered primarily for local workshops. In addition there may be no common instructional model or process being applied. Similarly, there may be no a clear focus on content outcomes. The Carnegie Academy for the Scholarship of Teaching and Learning (<http://www.carnegiefoundation.org/CASTL/>) has a library of exemplary instructional practices, but also no common methodology being applied to content design. In summary, most of the websites focus on a description and discussion of the content of projects, not showing teachers how to create and manage them to meet academic standards.

There are also several websites that provide information on and examples of **Problem** Based Learning, a complementary instructional approach that engages students in simulations or hypothetical problems (e.g., <http://score.rims.k12.ca.us/problem.html>, <http://www.imsa.edu/team/cpbl/cpbl.html>, <http://www.mccli.dist.maricopa.edu/pbl/sources.html>). These sites also appear not to support teachers who want to design their own projects. We have also found that Problem Based Learning designs and resources tend to be problem specific – even more content focused than typical projects. A teacher decides to use the prepared problem or not. While we discuss PBL in the paper as Project Based Learning, much of the research focuses on Problem Based Learning. As noted in the Gates report, both methodologies are commonly studied together and they “share the emphasis on complex, multipart tasks requiring active engagement in solving a realistic problem (and) seek to motivate students’ acquisition of knowledge by presenting them with interesting, complex problems or tasks that require that knowledge” (p. 65)

Planning and implementing successful **projects**, however, requires much more design work on the part of teachers, as they typically involve students in real-world, contemporary issues, and bring students in contact with community members – in person, or virtually, using technology. It is up to teachers (and students) to structure, guide, take stock, and revise the project as it unfolds. Depth of student learning is directly related to the teachers’ skill in project planning and implementation in part because there is typically no prepared text or scenario for the teacher to fall back upon.

The ability to support teacher professional development online is a topic that is receiving considerable attention (Renninger & Shumar, 2002). Many online communities of teachers based in schools of education are using technology to explore variations of PBL in the classroom. However, it is still rare to find an entire course

devoted to PBL methods for teachers. If there are such courses (besides the one at BSU) they seem not to be made widely available for free use.

Outside of teacher education institutions, there are numerous online sites that allow exceptionally innovative teachers to develop and share projects in a way that permits “a thousand flowers to bloom”. Examples might include Global School House, ThinkQuest, and the Online Internet Institute (Ravitz & Serim, 1997). Others sites may focus on a specific approach to problems or projects, e.g., Web-Quests. These do have well-defined templates for creating projects, but there may be less emphasis on how to plan effectively and to meet content standards. These projects may promote meaningful learning but they may have difficulty matching the activities to curriculum standards, except technology standards for teachers and students.

Libraries of curriculum, e.g., G.E.M., Merlot, have not focused on common instructional approaches or offered clear strategies for using their libraries to guide teacher professional development. For example, professional development uses of their libraries might focus on the instructional usefulness of different types of resources and enable teachers to contribute materials. Typically these projects employ expert panels, without giving teachers the opportunity to develop their own expertise as reviewers or producers of educational materials (Ravitz, 2004; Ravitz & Lake, 1996).

To summarize -- What is unique about the PBL-Online project is that it offers nationally- and internationally-available opportunities to learn and collaborate about PBL using a specific methodology. The methodology represents a careful distillation of a common-sense planning model for teachers. This is offered as a freely accessible multimedia website and course with step-by-step, systematic training for teachers in planning and implementing and assessing standards-focused Project Based Learning.

This work fills a gap in teacher preparation resources by creating a multi-level, systematic website that uses video, audio, text and highly interactive exercises to: 1) introduce pre-service and practicing teachers to Project Based Learning, 2) provide teachers with in-depth, systematic instruction in the planning, implementation and assessment of standards-focused PBL, 3) make a three credit online course dedicated to standards-focused PBL available to teachers worldwide, and 4) establish an online forum, project library and virtual community to advance scientifically-based PBL research and practice.

Design Considerations for PBL-Online

This project demonstrates different ways web-based technology can support teachers’ learning about PBL and their efforts to create academically rigorous projects. The website and online course are built around a specified set of steps to plan, implement and assess effective projects in classrooms, based on a proven methodology developed and refined by BIE over a five-year period and expressed in the second edition of the *BIE Project Based Handbook*. In addition, website and course design draws on the experience of the George Lucas Educational Foundation (GLEF) in creating, editing and disseminating digital audio and video to tell compelling stories about exemplary teaching (see: www.glef.org), and the experience of the Department of Educational Technology, Boise State University. The website and course are being delivered from a server housed at Boise State University and sponsored by BIE. The site assumes that users will have a DSL or faster Internet connection. It contains images, graphics, and text, and includes streaming audio and video. When possible, alternate text is provided for those with sight or hearing difficulties.

The PBL-Online design specifications are based on initial work done at Boise State University by a team of designers, researchers, and developers, led by Carolyn Thorsen (Chair, Department of Educational Technology) with Kerry Rice, Chareen Snelson and Sherawn Reberry.

The website is designed around four **pathways** that represent the four main content areas available on the PBL-Online site. Each of these pathways is discussed further below:

- 1) About PBL provides an introduction including an overview of the website and project planning methods, research data about PBL, expert opinion, and video segments;
- 2) Designing Your Project is the area where the five PBL modules are located;
- 3) Online Courses is where the course is offered from Boise State University and there are templates for using the course at other colleges of education;
- 4) PBL Co-Laboratory is where teachers can post and review project examples, collaborate on planning, and share ideas on PBL with others. Each is briefly discussed in the sections that follow.

PBL-Online may be used by teacher preparation and professional development programs in schools of education, alternative certification programs, school districts, and state departments of education, as well as professional developers, researchers, and others who are interested in PBL. One of our primary goals is to

stimulate the field to discuss PBL using a common framework. By making this resource widely available and publicizing its unique qualities we are helping make this happen. In-service staff developers will use materials directly from the site. Students in teacher training institutions will enroll in courses sponsored by their own institution and taught by their own instructors.

Pathway 1: About PBL -- An Online Introduction

Prior to using the self-instructional modules or on-line course, students can review an introductory module that introduces PBL, and provides video clips portraying the planning and implementation of several successful projects. This overview of PBL includes project planning methods, research data, and expert opinion, as well as video segments of teachers and students in high school, middle school, and elementary projects. It requires less than an hour to complete this introductory module. At its conclusion, users are oriented to the site as a whole, and invited to enter the second learning pathway. Appendix A provides an explanatory screen shot for the PBL-online homepage.

Pathway 2: Designing Your Project -- Self-instructional Modules

This is a set of five instructional modules based on the five-step planning process in the Handbook that can be accessed separately and used for staff development or pre-service coursework. The interactive PBL Modules are available on the Internet for use in an online course. The modules may easily be linked to instructor websites or learning management systems such as Blackboard or Web CT. How they are used depends on the course format and goals. In some cases they may be used as the central content for a fully online course where students never set foot in the same classroom. In other cases the modules may be used to either supplement a face to face course or to support a blended course where students meet in person part of the time and online the rest of the time.

Each of the interactive online modules (shown below, in Appendix B) is structured to provide an overview, exploration, practice, and self-assessment of the content contained within it. This "chunking" of units and creating a pathway through several related instructional events is consistent with the work of Bransford (2001) and the literature on re-use of learning objects (Wiley, 2000; Ravitz, 2004).

The "Overview" section is intended to catch students' attention and provide the big picture for each topic in the module. The "Explore" section presents information for each step in the PBL process. Videos are available to provide a glimpse inside real classrooms using PBL. Exploration opportunities will also consist of audio, graphics, and text regarding topics outlined in Appendix C. Examples of PBL techniques will be hyperlinked across the exploration section to provide multiple avenues of access for students.

The "Practice" section for each topic includes interactivity in the form of simulated role-playing exercises. This interactivity is supported by text, video, and audio providing students a rich learning environment. The Practice section of each module includes highly interactive exercises that allow teachers and teacher candidates to meaningfully engage in the planning process, and return to particular steps they find challenging or difficult. This grounds abstract, conceptual ideas in a typical and realistic environment, so that learners might be better prepared to transfer their knowledge and skills to actual classroom situations. Typical exercises for teachers learning about PBL include: 1) interactive sequences that require teachers to analyze and refine a Driving Question for a project, 2) an exercise asking teachers to choose appropriate standards and a set of outcomes for the project, 3) an exercise that helps teachers create an assessment plan for the project, including appropriate performance assessments and rubric language for the products generated in the project, and 4) a digital video of exhibitions or oral presentations of varying quality, in which teachers would view and score the presentations according to a rubric.

Finally, the "Assess" section provides opportunities for students to self-assess their understanding of the PBL concepts presented in each module. We are working on rubrics that teachers can use to assess projects they create and opportunities to provide peer-review and feedback to teachers.

Assessment	Typical Use	Benefits	Pitfalls
Objective	Test or quiz designed to measure student mastery of concepts and procedures.	Easy to administer and score.	Difficult to control the testing environment. A testing center or proctor may be needed.
Checklist	Check off completion of a list of tasks.	Easy to use. May be used by instructor or students.	Measures task completion only.
Rubric	Assessment of projects, products, presentations, or online participation.	Establish criteria for a range of quality levels.	There may be difficulty when selecting appropriate criteria and quality indicators for the product.

Source: BSU PBL Instructors Manual (Snelson & Reberry, 2004, DRAFT)

Over the next year, we expect to develop a richer system of rubrics and evaluation tools for instructors and teachers. For example, a rubric would be the best assessment instrument to evaluate a final project where students are required to develop a Project Based Learning unit. Keep in mind that each type of assessment has benefits and pitfalls (Stiggins, 1997). A summary of each type of assessment is shown in the table below to help identify salient features and support ease of comparison.

Pathway 3: Online course

An expanded version of the modules making up Pathway 2, this course combines the same five modules with assessments and an instructor guide to provide a complete online course for schools of education worldwide. It is organized into a 45 hour, moderated, 3-unit course to be offered by Boise State University. In this online course, students receive feedback and participate in online, facilitated discussions. In addition to the course itself, the following resources are available to support use of PBL-Online for full-credit courses.

- Teaching Online Guide: General information about online teaching.
- Learning Online Guide: General information about learning online.
- Sample Syllabus: A sample PBL Course with templates for creating your own course.
- Downloadable Teacher's Guide (Word): A guide for teaching PBL including a sample syllabus, course schedule, and templates for an online PBL course.

This Teaching Online Guide has been developed to serve as a resource and road map for instructors planning to use the PBL Modules in their courses. There are four sections. The first section is an introduction and overview of the PBL Web site. Next, there is a section devoted to teaching and learning online. This information has been developed with the online PBL course instructor and students in mind. The third section of the manual is an overview of each of the modules. This section includes suggestions for teaching the module along with related resources. Several appendices including planning tools and examples, sample assessment instruments, examples of discussion questions and student responses, and a master list of online resources make up the fourth section of the manual (Appendix D).

The teacher's guide explains how to use the modules and other resources available on the PBL Web site. It also provides tips, strategies, and resources for anyone who is interested in general information about planning and teaching an online course in Project Based Learning. For example, the following is offered for consideration prior to launching the online course: For example, a list of topics for online student orientation includes:

- Basic computer skills: File management, hardware, and operating systems.
- Internet skills: Search strategies, print and save, and general browser use.
- How to use the course management system: How to login and use the tools.
- Course navigation and structure: How to locate information and assignments.
- Course expectations: Minimum requirements for participation.
- Time management: Suggestions for setting up a schedule to complete coursework.
- Netiquette: Rules for acceptable online etiquette.
- Getting Help: Procedures for obtaining help.

The sample syllabus includes two weeks orienting students to the course and PBL, five weeks of working through the modules, two weeks of planning a project, and one week of collaborative review. Schools where PBL-Online is being piloted include:

- San Francisco State University, Department of Instructional Technology
- Kean University, School of Education, NJ
- Iowa State University, IA
- Xavier University of Louisiana, LA

Additional schools are welcome to add PBL-Online to their course offerings. Their instructor can use the Boise State University course freely. Alternatively, if individual teachers or students want to take the course, they can enroll in the Boise State course and transfer the credits.

Pathway 4: PBL Co-Laboratory

Our ultimate goal is to establish this website as a “home” for the community of teachers who use the resources of the web site and want to share the standards-focused projects they have developed using the BIE project planning method. This pathway extends the web site into a collaborative that enables teachers to post and view project examples, collaborate on planning, and share ideas on PBL. There will be the opportunity to contribute to a standards-focused project library and upload digital versions of project artifacts, including photos, videos, rubrics used to evaluate projects, log entries, project planning documents, and written commentary about the planning and implementation process. In short, we will be investigating ways to make the project come alive and be more transparent and understandable.

Work on the co-laboratory is not scheduled to begin in earnest until after the rest of the site has been built. Initially conversations among teachers and students in PBL-online may focus on the “simulated” exercises provided in the modules. However, once projects are created by teachers we hope these will be shared in the co-laboratory and become an even more authentic topic of discussion, i.e., about actual work by teachers and students in the co-laboratory.

When teachers complete their online course and “graduate” they will be able to come back to the co-laboratory to support their ongoing teaching and learning using PBL. At the same time, once the co-laboratory is built, we expect teachers using the course to migrate effective presentation and review of materials from their online course into the co-laboratory for others to see. While collaboration initially will take place within individual courses, once several courses have begun posting to the co-laboratory the course may be refined to include posting and review of work across distant sites in the co-laboratory.

To ensure high quality, before project materials are made accessible to others they will be reviewed by expert PBL teachers and teacher trainers. This section of the web site will also house a listserv or similar collaborative structure to encourage sharing of ideas, questions, and resources among PBL-using teachers. As noted earlier, this might help teachers become expert reviewers of projects and student work by learning to apply a rubric to judge project qualities. In addition, unlike practicing teachers, there can be strong incentives put in place as part of the 3-credit course for students to contribute to the co-laboratory. This is something we will pursue in the future.

Another function of the co-laboratory pathway will be to unite teachers and researchers committed to understanding the impact of PBL on student learning, motivation and achievement. Researchers wishing to pursue scientifically-based research on the process and impact of PBL will be able to seek out teachers interested in participating in research studies. At the same time, teachers who wish to have empirical data about the effectiveness of their instruction will be able to contact researchers and offer their classrooms as research sites. BIE will support PBL research by posting relevant articles, links, and data collection tools. BIE will also take the lead in organizing PBL research among co-laboratory participants during the third year of the project. Finally, BIE will integrate an online data collection process into Pathways 2 and 3 to collect feedback on

module and course effectiveness, and establish a procedure that allows teachers to “opt in” to a database of PBL using teachers interested in learning about future research opportunities and results. In short, the PBL-Online co-laboratory will promote interaction between teachers approaching PBL-Online through different avenues.

Conclusion

There are a number of research opportunities and partnerships that we will be pursuing further. This is a different model for collaboration and research because we are sharing our methodology freely and providing adopters with the means to continue to conduct their own evaluations or to contribute to a shared database. We are confident our approach will work for pre-service teachers, but, because the incentive system is very different for in-service teachers, we have questions about how to most effectively offer this resource to in-service teachers. Starting next year this project will be reporting on the results of data collection from instructors and students for formative and summative evaluation purposes.

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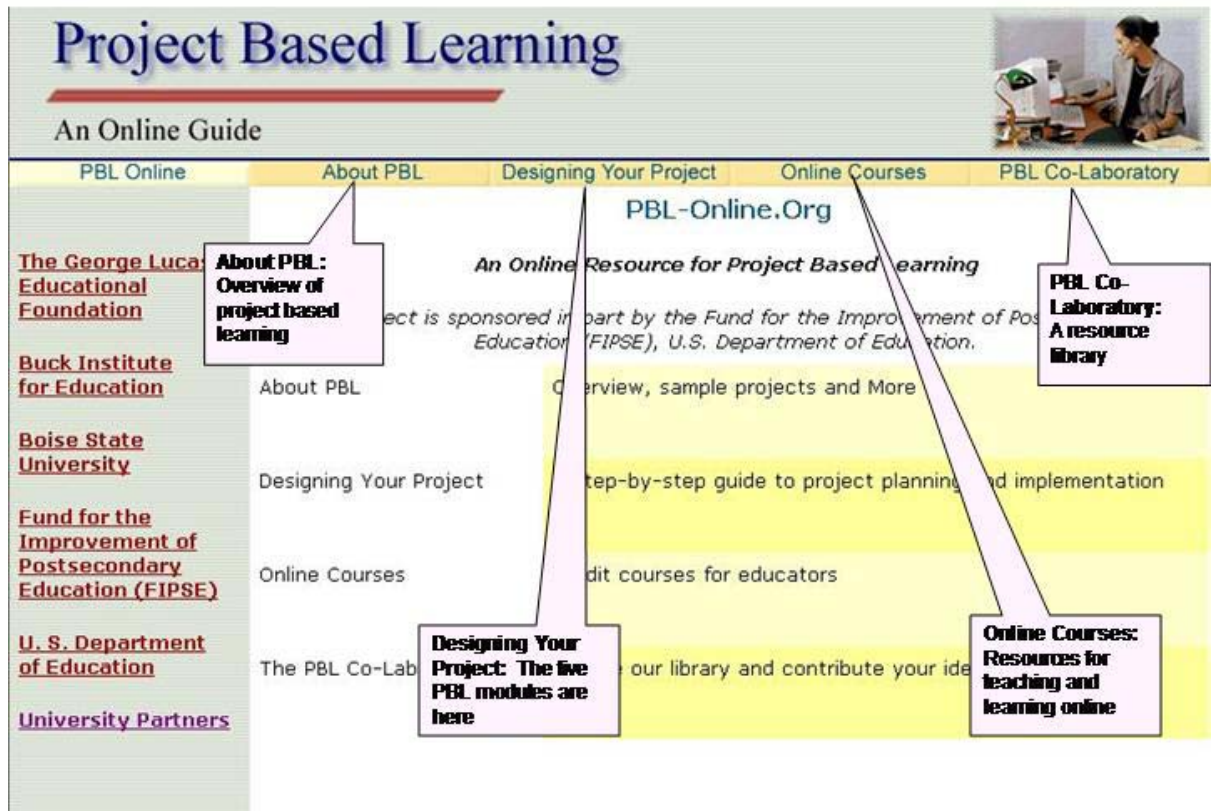
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Appendix A. PBL-online Homepage



<http://edtech.boisestate.edu/fipse/default.htm>

Appendix B. Modules for Pathway 2: Designing Your Project

Module 1



Begin With the End in Mind

Great projects begin with planning for the end result. In this section, you'll conceive manageable projects with engaging themes and high standards.

Module 2



Craft the Driving Question

Distill the theme and content standards into a significant, meaningful question that engages students and helps them focus their efforts throughout the project.

Module 3



Plan the Assessment

Every project should be driven by an explicit set of outcomes that encompass the key content and skills that students are expected to learn.

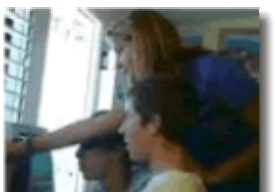
Module 4



Map the Project

A well-constructed project map includes more than a sequence of activities; it is a design for structuring the project and directing students.

Module 5



Manage the Process

Tools and strategies help you manage the process of Project Based Learning.

Appendix C. Exploration Sections in Each Module

Module 1: Begin with the End in Mind

- Explore 1: Develop a Project Idea
- Explore 2: Decide the Scope of the Project
- Explore 3: Select Standards
- Explore 4: Incorporate Simultaneous Outcomes
- Explore 5: Work from Project Design Criteria
- Explore 6: Create the Optimal Learning Environment

Module 2: Craft the Driving Question

- Explore 1: Guidelines for Crafting the Driving Question
- Explore 2: Refining the Driving Question
- Explore 3: Generating Driving Questions
- Explore 4: Developing Standards-Based Driving Questions

Module 3: Plan the Assessment

- Explore 1: Aligning Products with Outcomes
- Explore 2: Knowing What to Assess
- Explore 3: Using Rubrics

Module 4: Map the Project

- Explore 1: Organize Tasks and Activities
- Explore 2: Launch the Project
- Explore 3: Gather Resources
- Explore 4: Draw a Storyboard

Module 5: Manage the Process

- Explore 1: Your Role as Manager
- Explore 2: Share Project Goals with Students
- Explore 3: Use Problem-Solving Tools
- Explore 4: Use Checkpoints and Milestones
- Explore 5: Plan for Evaluation and Reflection

Appendix D. Links to Website and Supplemental Resources

To access the PBL-Online homepage, visit:

<http://edtech.boisestate.edu/fipse/>

To access drafts of course resources including the teaching and learning guides, visit

http://edtech.boisestate.edu/fipse/online_courses.htm

To explore several teaching activity ideas for the online PBL course, visit:

<http://edtech.boisestate.edu/FIPSE/TeachOnline/strategies.htm>

To learn more about distance education and online instruction, visit:

<http://edtech.boisestate.edu/FIPSE/TeachOnline/introduction.htm>

Additional information about online course design is available at:

<http://edtech.boisestate.edu/FIPSE/TeachOnline/design.htm>

To find out more about developing assessments for an online course, visit

<http://edtech.boisestate.edu/FIPSE/TeachOnline/assessments.htm>

Note. These areas are still very much in the development stage. If you want to visit the site you may freely do so. However, parts of the site require a user login and password. If you are prompted for a login, you will have to contact the author for access at this time.